

What is claimed is:

- 1 1. A field emission display comprising:
 - 2 an anode;
 - 3 a phosphor located on the anode;
 - 4 a cathode;
 - 5 an evacuated space between the anode and the cathode;
 - 6 an emitter located on the cathode opposite the phosphor;
 - 7 wherein the emitter comprises an electropositive element both in a body of the emitter and on a
 - 8 surface of the emitter.
- 1 2. A display as in claim 1 wherein the distribution of the electropositive element in the body
of the emitter is substantially even.
- 1 3. A display as in claim 2 wherein the electropositive element comprises an element
chosen from group IA of the periodic table.
4. A display as in claim 3 wherein the electropositive element comprises Cs.

1 5. A display as in claim 2 wherein the electropositive element chosen from a group
consisting of H, Li, Be, B, Na, Mg, Al, Ga, Ba, Rb, Ca, K, Sr, and In.

1 6. A display as in claim 2 wherein the electropositive element is chosen from group IIA of
the periodic table.

1 7. A display as in claim 2 wherein the electropositive element is chosen from group IIIA of
the periodic table.

1 8. A process for manufacturing an FED comprising the steps of:

2 forming an emitter comprising an electropositive element in the body of the tip;

3 positioning the emitter in opposing relation to a phosphor display screen;

4 creating an evacuated space between the emitter tip and the phosphor display screen;

causing the electropositive element to migrate to the an emission surface of the emitter.

1 9. A process as in claim 8 wherein said forming comprises:

2 forming an emitter;

3 contacting the emitter with a solution, the solution comprising an electropositive element as the

solute.

10. A process as in claim 9 wherein said solution comprises an alcohol solvent.

1 11. A process as in claim 10 wherein said electropositive element comprises an element
chosen from group IA of the periodic table.

12. A process as in claim 11 wherein the electropositive element comprises Cs.

1 13. A process as in claim 10 wherein the electropositive element is chosen from a group
consisting of H, Li, Be, B, Na, Mg, Al, Ga, Ba, Rb, Ca, K, Sr, and In.

1 14. A process as in claim 10 wherein the electropositive element is chosen from group IIA of
the periodic table.

1 15. A process as in claim 10 wherein the electropositive element is chosen from group IIIA
of the periodic table.

1 16. A process as in claim 9 wherein said contacting comprises dipping the emitter into the
2 solution for a time sufficient to cause doping of $10^{21}/\text{cm}^3$ of electropositive material to penetrate
into the emitter.

1 17. A process as in claim 16 wherein said solution comprises propan-1-ol as the solvent and NaCl as the solute.

1 18. A process as in claim 17 wherein said solution is at a temperature below the boiling point of the solvent and said contacting continues for about 15 minutes.

1 20. A process as in claim 16 wherein said solution comprises methanol as the solvent and CsCl as the solute.

1 21. A process as in claim 17 wherein said solution is at a temperature below the boiling point of the solvent and said contacting continues for about 15 minutes.

1 22. A process as in claim 8 wherein said forming comprises:
2 forming an emitter from a substrate comprising electropositive material, wherein the emitter
3 formation causes electropositive material to be exposed and react at the surface of the emitter;
4 and
removing reacted electropositive material.

1 23. A process as in claim 22 wherein exposed electropositive material forms an oxide and said removing comprises washing with a buffered oxide etch.

1 24. A process as in claim 22 wherein exposed electropositive material forms a salt and said

removing comprises washing with water.

1 25. A process as in claim 8 wherein said forming comprises:

2 forming an emitter;

3 vapor deposition of an electropositive element in on the emitter;

heating the emitter to cause the electropositive element to penetrate into the body of the emitter.

1 26. A process as in claim 25 further comprising removal of unpenetrated electropositive
material from the surface of the emitter.

1 27. A process as in claim 8 wherein said forming comprises:

2 forming an emitter;

ion implantation of an electropositive element in on the emitter.

1 28. A process as in claim 8 wherein said causing the electropositive element to migrate to the
2 an emission surface of the emitter comprises heating the display after the space is evacuated,
3 wherein the electropositive element migrates to the surface creating a low work function for the
emitter.